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SOIL CONSERVATION

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★ THIS MONTH ★

TOM DALE, Editor

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OUR SOIL ★ OUR STRENGTH

CHRISTMAS TREES FROM STRIP MINES.—Trial plantings indicate that the coal mine spoil banks for Cherokee County and other southeast Kansas areas may become valuable for Christmas tree production.

More than 15 thousand acres of land have been stripped for coal in Cherokee County. Other nearby counties have thousands of acres of strip mine dunes. This land has a very low evaluation for tax purposes, or is not taxed at all, and its agricultural value is quite low.

The coal mining companies have tried various grasses and legumes on these dunes. The results were not satisfactory. Sweetclover has given the most satisfactory returns for pasture. Trees, for lumber production or other uses, have been tried, but the results were not encouraging.

The Cherokee County Soil Conservation District, in 1952, provided 2,400 evergreen trees, including several varieties of pines, spruce, fir trees, and arborvitae. These were planted on strip coal land as a field test.

(Continued on P. 103)

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—Robert and Joanne Morse harvesting multiflora rose berries for the Christmas trade, near Westminster, Vt.

—Photo by E. L. Rowe

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International Range and Pasture Judging Contest

By SELLERS G. ARCHER

ON a rainy day last May, over 500 people moved in groups on the grassy slopes of the Jack Hall ranch near Oklahoma City. They were playing a game designed to teach, in contest form, the hard-to-teach subject of grassland agriculture. They were contestants and observers at the Third International Land, Range, and Pasture Judging contest sponsored by WKY radio and TV stations.

The importance of the event is attested by the fact that there were representatives from 28 States, Puerto Rico, Hawaii, and the five continents, and by the fact that intermittent rain falling throughout the day did not discourage full participation.

Range and pasture conservationists have long thought that there are two basic elements in teaching grassland management. One is the identification of plants. The other is the identification of sites, which includes a recognition of soil, slope, and other conditions that affect the growth of plants. Recommendations for establishing, maintaining, or improving grassland must be based on these two elements.

Educators have long used the contest idea as a teaching aid in many subjects: Witness the ciphering matches and spelling bees, livestock and land judging—and now range and pasture judging contests.

At the Oklahoma City event, FFA boys and 4-H club members were in the spotlight, competing for more than $2,000 in team and individual prizes as well as numerous trophies and medals. But there were other divisions in the contests, too. They were for women and girls, adult men, college students, and foreign contestants.

Prior to the big show, there were hundreds of contests sponsored by soil conservation districts, chambers of commerce, and other civic groups. These contests were held on levels that included members of a club or chapter; clubs within a soil conservation district or county; and districts including several counties. According to varying State rules and the expense money available for taking contestants to Oklahoma City, county, district, or State winners were eligible for competition in the national and international contests.

At the International Range and Pasture Judging contest, team members were separated and put in different groups led by volunteer workers from the Soil Conservation Service, Vocational-Agriculture departments, and other agencies. These groups were led to a set of "fields."

At one, the contestants, working individually, checked pertinent facts concerning each plant marked and numbered. On the score card for that field they wrote each plant's common name

Clarence Kingery, SCS range specialist, (left) gives instructions to contestants at a contest site.

Note:—The author is work unit conservationist, Soil Conservation Service, Cordell, Okla.

and checked whether it was perennial or annual, warm or cool season, climax or invader. A separate card was used for each of the other fields where the site was determined. Also marked was the degree of utilization and treatments needed to maintain or improve the grass.

Finally, the contestants inspected a field to be planted to grass. Land capability was determined from soil texture, permeability, slope, and other factors, which were marked on their score cards. A small trench exposed a soil profile to contestants for examination of texture, permeability, and depth. From this basic information they recommended plants and treatments to be used in establishing a new pasture.

An awards dinner was the commencement exercise of the 2-day school and contest, and dozens of young people and adults walked proudly across the stage to receive from Dr. Oliver S. Willham, president of Oklahoma State University, their degrees in the forms of checks, trophies, and medals.

Oklahoma contestants took a great share of the honors in the range and pasture contest. But teams and individuals from other States, especially Texas and Kansas, won many cash prizes, medals, and plaques.

As other States develop new and successful methods of teaching soils and grassland management, they will place more teams and individuals in the winning column, thinks Edd Roberts, Oklahoma's extension soil conservationist, and one of the originators of the State and national events. On the Oklahoma extension team with Roberts are Clarence Bunch, range specialist, and Dick Chiles, pasture specialist. Cooperating with local groups, they give at least 1-day's schooling a year to 10,000 Oklahoma students and adults. Other personnel in county extension offices, Soil Conservation Service work units, and Vocational-Agriculture departments give training to an estimated 10,000 others. Soil conservation districts, chambers of commerce, and other groups cooperate to provide facilities and give prizes.

Lyle B. Leonard, extension specialist in soil and water conservation, University of Kentucky, is developing plans and training leaders for the inauguration of pasture judging contests. He had one team in the land judging contest at Oklahoma City this year. He wants the students to learn to fit pasture plants to the soils where they are best adapted. And observers were present from several other States that have not yet adopted the contest idea for teaching soils and pasture sciences.

Contestants from States where the types of native pasture plants found in the Southwest are of minor importance are at some disadvantage in the international contest, although many of the plants are found in most States of the Union. There are provisions, however for minimizing the handicap. Illustrated and descriptive booklets issued by the Phillips Petroleum Company help students to learn the identifying characteristics of most of the plants. Many text and reference books outline the basic management principles, which are

Earl K. Lowe, chairman of the Land Appreciation School, before a grass display at the State fair grounds in Oklahoma City.

John Smith, Hammon, Okla., receives trophy for placing first in FFA division from Oliver S. Willham, president, Oklahoma State University.

standard everywhere. Moderate training should enable teachers to give their students the essential background.

On arrival in Oklahoma City, contestants may study displays of the range plants taken directly from the field. On the first day a school is held, contest rules and range management principles are discussed. Field sites and plants, identical or similar to those to be judged the next day, are set up for study. Instructors from Oklahoma State University and the SCS give adequate instruction on the identification of range plants, range sites and conditions, as well as the pasture plants and practices common in the area. A properly trained student from any part of the Nation is not at a great disadvantage in the contest.

Not only is a greater use of the contest principle in teaching grassland agriculture popular in the States; foreign observers like the idea, too. Those more fluent in the English language reported they were impressed, and many hoped to get such contests initiated in their own countries.

For example, Orlando Fontes Lima, from Brazil, was "fascinated", as he put it, at the enthusiasm shown by young people and adults, and by the fact that boys and girls, men and women—all were participating.

When asked if the contest method for teaching land, range, and pasture judging would be used in his country, Lima said that the decision would be made by his superiors in the Ministry of Agriculture. But if the idea is adopted, he said, he thought it would be appropriate to hold the contest on April 15, which is the birthday of Dr. H. H. Bennett, and for that reason is designated by law as "Soil Conservation Day" in the State of Sao Paulo. In Brazil, as in the United States, Bennett is regarded as the father of soil conservation.

Lima is an instructor in agricultural engineering at Fazenda Impanema, which is a federal agricultural training center in the State of Sao Paulo—the only one of its kind in South America, he says.

The program is destined for South Africa too, it seems. T. E. de la Hunt, group conservation and extension officer in the federal department of conservation and extension, of the newly formed Federation of Rhodesia and Nyasaland, was also impressed. He said that he will "make definite recommendations" that land, range, and pasture judging schools and contests be inaugurated for their YFC (Young Farmers' Clubs) and that their technicians be trained to conduct these events.

This new game, that teaches, may be played either formally or informally, with large or small groups, or with groups of differing ages, sexes, or races.

A father and son can enjoy elements of the contest in the home pasture, or two boys can compete in plant identification on their way home from school. Certainly, farm and ranch

T. E. de la Hunt (right), a contestant from Rhodesia and Nyasaland, studies a little bluestem plant with American advisors.

boys in training for a contest spend considerable time in pastures and on the roadside studying pasture plants. For every student who receives formal training, a brother, father, or playmate has some information passed on to him.

Recently the writer saw a 4-H club member and his father strolling across their native grass pasture, stopping to inspect a plant here and there. On joining them the boy reported that his dad didn't know that catclaw sensitivebriar was a legume and added nitrogen to the soil to help the grass grow. Indulgently the father admitted that the plant had been nothing to him but a "devil's shoestring." That afternoon he made friends with many new plants. As the boy excitedly described the characteristics of each plant, the proud father learned.

That afternoon the three of us determined the range site for the pasture, the degree of utilization, the range condition, and made plans for proper use.

In the study it was determined what plants were climax, or the highest order, for the site. When they were absent or scattered, or when they were in a weakened condition, it was natural for the farmer to want to know why and how to bring the grassland back into full production. The SCS technician's work was made easier because of a 4-H boy who was trying to make his club's range and pasture judging team. This is the payoff for the program that reaches its climax in the international contest near Oklahoma City each spring.

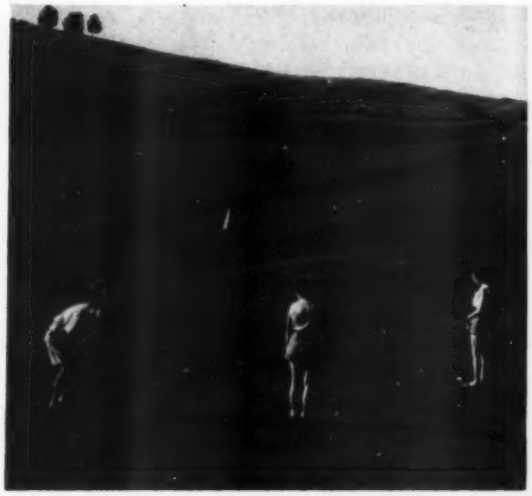
The national and international contests represent a cooperative effort among the agricultural agencies, the sponsor, and other private and public groups. Twenty-four committees with more than 100 members divide the preparatory work. Dozens of others are enlisted for special work during the event. But, so well is the groundwork laid that the crowded 2-day schedule runs effortlessly.

Last spring at this meeting Keith Mathers, manager of WKY, summed up the attitude of the sponsor and the horde of voluntary workers: "We are very serious about this work and very jealous of the contests. This opportunity for service is not for sale. We will continue our sponsorship, and you can count on us."

SHOWING YOUR WARES.—"In soil conservation as in show business, you keep your best foot forward and the shoe well shined," says J. T. McLaurin, work unit conservationist, West Jefferson, N. C. When a golf course was built at West Jefferson, Mac saw an opportunity to put his best foot forward—conservationwise.

Calling on Dean Lawrence, a cooperator with the New River Soil Conservation District, whose farm adjoins the golf course, Mac got him to put in stripcropping right against the club's boundary at the ninth hole. As a result, a great many people playing the course, permanent residents as well as summer visitors, have looked at the arrangement and have been intrigued by it.

So many asked questions about it that Walter Godby, manager of the club, asked Mac to explain to him his reasons for arranging the crops in strips. Godby wanted to know so that he could pass the information along to puzzled golfers.



The ninth green of the West Jefferson Country Club with stripcropping in the background.

When it comes to stripcropping, Mac is known throughout North Carolina as its greatest promoter. A big reason for his success in getting stripcropping on so many farms in Ashe County is his use of good public relations. As in this case, he never misses an opportunity to plug stripcropping. He writes about it, talks about it, and shows it off to visitors.

As a result, Mac has induced most farmers, cooperating with the New River district, to practice stripcropping. On farms where there isn't any stripcropping it's usually because the owners are planting alfalfa or have established grass solidly on a grass-base rotation. And this, as Mac points out, provides even more soil and water protection than stripcropping.

—LEON J. SISK

SOIL COMPACTION BY FARM MACHINERY

By M. L. NICHOLS

No. 29

This is the twenty-ninth of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

TECHNICAL advances in agricultural production during recent decades have brought many problems. Production per farmworker has practically doubled since 1940. The resulting overproduction makes control of production, to avoid glutting of markets, a real economic problem. But that is not the only "headache." This rapid increase in efficiency, which has been to a great extent achieved by mechanization, is also bringing other problems. One of these problems is soil compaction.

The causes of soil compaction are complex. With the substitution of tractor power for horses and mules, there was a material reduction in many areas of meadow and pasture. The area in grass, which was a major crop in the rotation when we used animal power, was materially reduced on our best cultivated land. This left the soil more susceptible to compaction and puddling or smearing.

Under modern standards of production efficiency men must handle large units of machinery, using big plows and harrows, three- or four-row cultivating equipment, and heavy harvesting equipment such as combines or cotton pickers. This large equipment means big power units and big power units mean heavy weight for traction and heavy weight means compaction of the soil. Compaction of the soil means reduction of infiltration of water and air. In some conditions this compaction becomes sufficiently serious to materially reduce yields by limiting the feeding area of the roots. The correction of this not only involves machinery changes but may require many adjustments in soil and land management.

The problem of soil compaction by power equipment is a real one wherever heavy tractors or implements are used. At the National Tillage Machinery Laboratory, we find that the problem is nationwide, but its seriousness varies from place to place. Foreign technical literature indicates an ever-increasing consciousness of the seriousness of the problem under the high-pressure use of land in Europe. It is the subject of a major project at the research institutions at Braunschweig, Jena, and Baden-Baden, Germany, and the National Institute of Agricultural Engineering at Silsoe, England. The problem is being studied at the Soils Laboratory at Versailles, France, and the Russians have published a number of papers on this same subject. It is a universal problem of power farming, but the extensiveness of the organized attack in the United States and the careful and systematic work of our colleagues in Europe should enable us to develop satisfactory solutions.

There is nothing particularly new about the reaction of soil to pressure producing compaction; but, the increased use of heavier machinery puts the subject in the category of urgently needed information and it is being discussed as though it were a new subject.

For the sake of simplicity we will ignore the wide variation found in different soils and discuss the reaction of one of the best agricultural soils in the Coastal Plains as a typical case. The Faceville sandy clay loam will serve as an example. Faceville was one of the soils studied by Cooper, Kummer, and members of the SCS operations staff to determine its infiltration rate for irrigation water. This soil, like most good agricultural soils, has a definite structure, which collapses under the heavy pressure of tractors and implements when in moist condition, leaving the soil almost impermeable. The infiltration, which was fairly high in its normal condition, was reduced by packing with tractors

Note:—The author is director, National Tillage Machinery Laboratory, Agricultural Research Service, Auburn, Ala.

and tillage until the soil became practically impermeable at plow depth due to the formation of a plowsole or pan below the depth of plowing. Root formation was limited to a shallow 6-inch surface layer. This compaction reduced infiltration and available water supply. Crops became subject to drought and yields were limited.

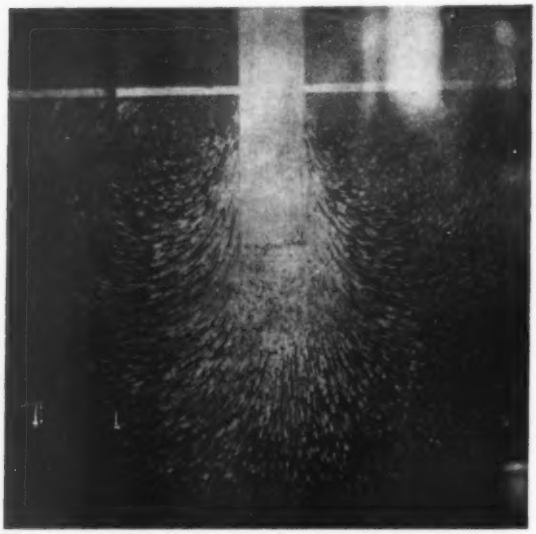


Figure 1.—Shows movement of soil particles when plunger is pushed into the ground.

In many cases, due to the fact that a farmer can get over the land so rapidly and easily, he overdoes his cultivation and goes over the land many more times than he did with horses and mules. At a number of experiment stations studies are being made to determine minimum tillage necessary for high production.

Another factor that contributes to compaction is that a soil dries out at the surface and may appear quite solid, while at plow depth it is still moist and plastic. The more moisture there is, the easier a soil compacts; hence, serious damage may be done with little surface evidence. This is particularly true when a wheel of the tractor runs in the furrow in plowing. A little packing and a little slipping of the tire in the moist soil may result in a practically

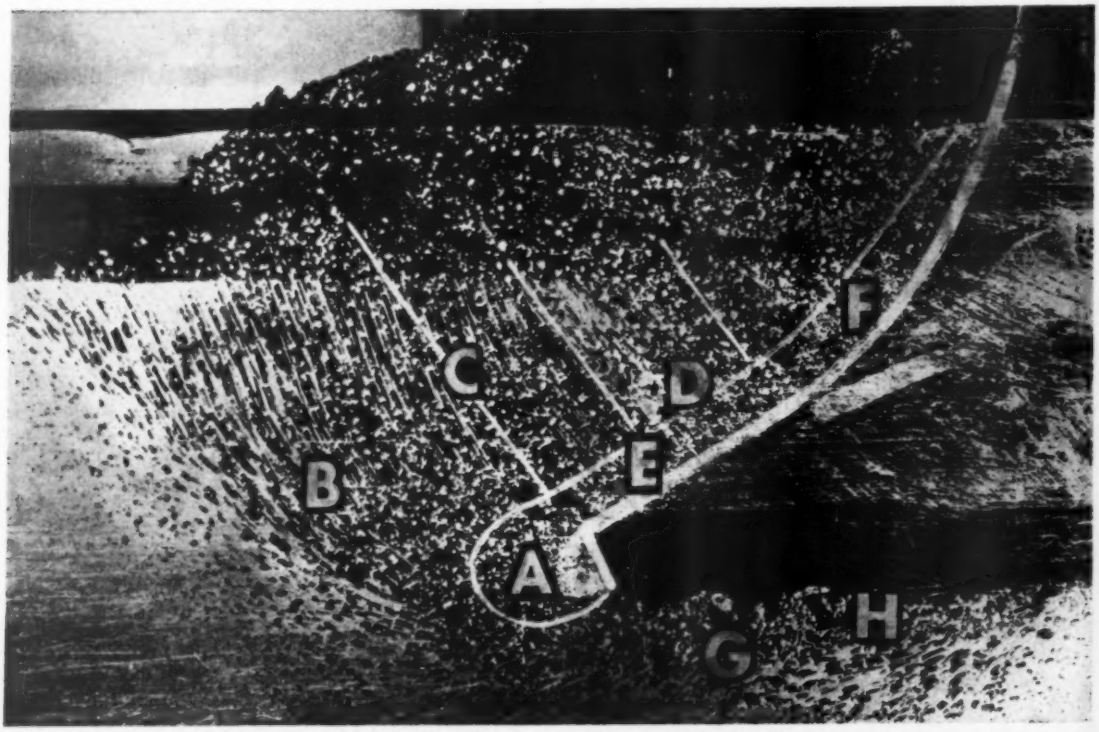


Figure 2.—Illustrates the formation of a plowsole where a blunt-pointed plowshare is used. (See explanation in text.)

impervious plowsole or traffic pan.

A slipping tire smoothes the soil and seals the pores in the soil beneath the tire by smearing the moist soil into them. It is reported some German farmers are unwilling to use their tractors for spring cultivation because they fear damage to the soil structure. The resultant deterioration of plant growth is attributed by them to be caused as much by the slippage or sliding of the wheels as by the weight of the tractor.

Studies of the effect of puddling under way at the National Tillage Machinery Laboratory at Auburn indicate that this puddling or smearing is a major factor in sealing off subsoil from air or water movement, and evidence that we have gathered to date indicates that smearing or puddling in many cases is a really serious factor.

The technical study of the effect of pressure on soil compaction is an interesting one. Since it goes on underground, usually with little or no evidence on the surface, its study requires special equipment and techniques.

Figure 1 shows soil moving before a plunger which is being pressed into the soil beside a glass plate covered with aluminum powder. The markings on the plate are made by the soil particles scratching the aluminum powder. Some soil is trapped before the plunger and is pushed before it, forming an entering wedge. This wedge pushes soil to the side. The displacement of the plunger is equal to the reduction of soil pores or the swelling of the soil surface. Squeezing the air or water from the soil pores is, of course, compaction; and, stresses and strains of soil movement, such as shown, occur whenever a wheel or track sinks into the soil. Usually the movement is not in such an exaggerated manner as shown by the photo, except where the wheel sinks into very loose soil or mud.

Soil follows definite laws of behavior and to find and understand these laws is the job of the scientist. If we painstakingly study the simple behavior of soil, after many repetitions, and by using the best equipment for viewing and measuring cause and effect relationship, we find there is order in nature.

For example, let us follow the reaction of soil to a dull plowshare when forming a plowsole. In figure 2, we have exaggerated the dullness of the plowshare by making the edge of the share excessively thick so as to see what it does to make a plowsole. The share is moved in the soil beside a powdered aluminum covered glass surface so we can see how the soil reacts by observing the scratches on the aluminum. The thick edge of the share catches some soil and forms a cone or wedge (marked A) and this pushes forward compressing the soil ahead of the plow. The soil, after a certain amount of compression, breaks or shears in definite planes, one of which is shown at C. A low pressure or poor scouring area develops above this cone at E, and the soil sticks to the moldboard at F. Finally, scouring ceases and the entire moldboard is gummed up with the soil moving over soil approximately on a line marked D. On the bottom of the plow the cone presses downward and forward, compressing and smearing the soil in the area G, making a plowsole. The soil at H has become roughed up due to its sticking to the bottom of the cone A and being pulled by cohesion as the cone advances, leaving the furrow rough on the surface but compact and smeared underneath to form a layer with reduced permeability for air or water.

Figure 3 shows the effect of packing of tractor tires on the emergence of peas grown for a

Figure 3.—Uneven emergence of peas caused by packing of wet soil where tractor wheels traveled.

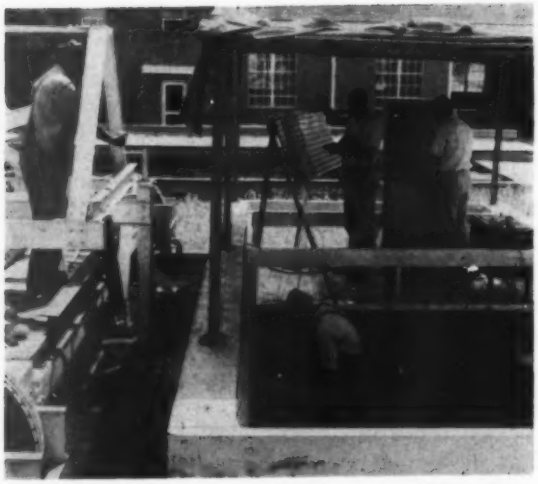


Figure 4.—Some of the technical equipment used to study forces of compaction at the National Tillage Machinery Laboratory.

cannery. The packing of wet, cold soil retarded emergence, so that ripening was delayed and at harvest time some peas were ready, others were not, with the result that the value of the crop for canning was reduced.

Many examples of the importance of understanding and controlling compaction can be pointed out. The problem is receiving careful technical study in controlled laboratories and by simple field trials to evaluate possible solutions. Figure 4 shows some of the equipment for a technical study employing electronic methods to measure stress distributions in the soil, using the Cooper soil pressure cells.

Unfortunately, we have not gone far enough with these studies to give the farmer or the machine designer specific instructions or to set forth limitations for avoidance of compaction on the various soils under various conditions. Since soil management will always depend in large part on the judgment of the farm operator, all we can hope to do is to get sufficient basic information to enable the farmer to plan sound management programs, to intelligently appraise conditions, and to enable the designer to understand physical limitations of soil resistance.

At present, we can call attention to the extreme importance of moisture in compaction or puddling. When the soil has sufficient moisture so that it can be packed densely into a plastic ball, or the moisture is sufficient, so that it can be rolled out into a wire-like form, approximately a quarter of an inch thick, it is too wet for cultivation or traffic. Its general condition to resist compaction, in the long run, can be materially improved in most cases by a good rotation which includes grass or grass-legume mixtures.

It is easy to examine the soil to see if there in any kind of dense layer that has formed at plow depth, which materially reduces infiltration. Removing both ends from a tin can provides a cylinder which, when pushed into soil, so as to hold water in it, enables one to make a reasonably accurate measurement of the rate of infiltration. If the subsoil is permeable and the test shows there is a dense impermeable layer above it, the chances are that there is some kind of a plowsole formed which needs looking into by an engineer or a soil scientist.

PONDS ALONG THE HIGHWAYS

Public Ponds Are Being Developed for Recreation and Utility Purposes Along Maryland Highways.

By JAMES A. SEAMAN

FARM ponds and public ponds along State and National highways are becoming a common sight in Maryland. And the people of the State are enjoying them in many ways. You'll find old and young using them for fishing, picnicking, and skating. Some ponds also serve as a water source for fire fighting.

"We realized several years ago that highway builders were passing up many good pond sites," explains John E. Clark, who heads up the Keep Maryland Beautiful committee. "They pass up sites not only for ponds that would improve the scenic appeal of the highway route, but ponds the people of the nearby communities could use for recreation. Often the road building actually creates good pond sites."

Note:—The author is work unit conservationist, Soil Conservation Service, Bel Air, Md.

So, when the Bel Air-Aberdeen State Highway No. 22 was to be improved, plans included a pond on Bynum Run, just outside Bel Air. Soil Conservation Service engineers designed the pond and supervised its building.

"The basic soil conservation principle was involved here—the principle of proper land use and treatment," Clark pointed out. "The pond area was a swamp. A lot of good land was lying idle because of its wetness. The pond drained all of this wet area. Now, all the land around the pond, aside from the recreational area, is in productive pasture."

A community pond on Route 23 in Forest Hill was started by the Grange. Local residents gave the money to buy the pond site. The Maryland Game and Inland Fish Commission built the pond and stocked it with fish. The grove between the pond and the highway was opened to public use by its owner, The Society of Friends.

An SCS-designed pond near Churchville was also owned by the Grange. When the Grange sold the property, the new owner, Dr. James McFinney gave the pond to the Level Fire Company. The firemen maintain the pond.

"After nearly every fire, we refill our tanks from the pond," Fire Chief Robert Knight said. "It serves us well."

Public pond near Churchville, Md., that is used by local fire company to refill tanks.

In addition to the public ponds scattered along the highways, there are innumerable private ponds that decorate the landscape and serve utilitarian purposes for the owners. Besides those noted, the State Roads Commission, Izaak Walton League, and soil conservation districts have also helped build or maintain public ponds.

Community pond and picnic area near highway in the Forest Hill community of Maryland.

Infrared Photos—T Sh

By GORD S. SM

HAVE you ever noticed the confused look on some people's faces when you mention "watersheds?" It happens too often.

We're likely to forget that many people outside of agriculture have never heard the word "watershed" before. Some aren't sure if it's the old boathouse down by the lake or the new water storage tank at the other end of town.

The dictionary says a watershed is an area drained by a stream or lake. It may include a few acres or several million acres. The idea is still hard to visualize unless folks can see it in one picture.

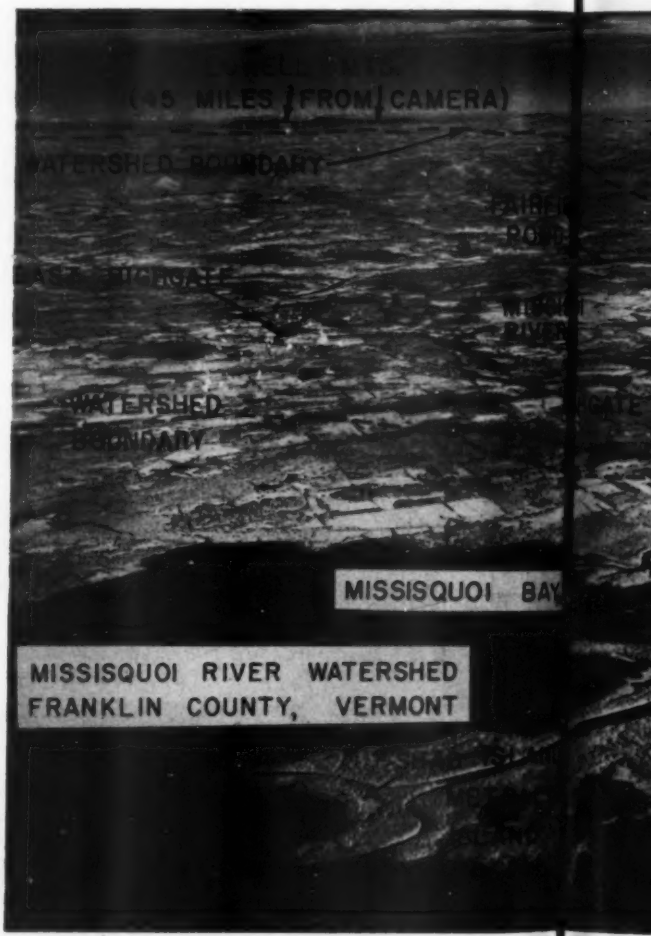
To cover an area of thousands of acres in one photograph, we usually think of a multi-engine plane and a big aerial camera. It is possible, however, to make some interesting photographs covering all or most of a moderately sized watershed by using a small plane and a 4x5 Graphic camera. The only special items needed are infrared film and a filter.

Infrared film has the ability to cut through the distant haze. More important, it has an interesting effect on vegetation and water. Green trees and fields turn to shades of light gray. Streams and lakes show up almost jet black. The contrast brings out details otherwise lost on regular film. Landmarks, 40 or 50 miles away, show good definition. Towns and highways stand out much clearer, too.

For shutter bugs interested in the details of infrared, aerial photography, here are a few do's and don'ts to remember.

You'll need a plane that can easily climb to 12,000 or 15,000 feet. To cover a 35,000-acre watershed you need to be about 10,000 feet above the ground. Wait for a good clear day that is not too cold. The temperature drops about 3° per thousand feet of altitude. If it's a nice comfortable 45° above zero on the ground, it will be a chilly 15° above zero up there. The photos should be made through an open window or door. It could be a little brisk under these conditions.

The film is slow and a red (A) filter must be used. At this altitude the plane flies with fair stability and the ground moves by slowly. A high shutter speed isn't necessary. A standard exposure for this film is one-hundredth second at f 5.6. Be sure you don't use any part of the plane to brace your arms or the camera; the vibration will blur the picture.

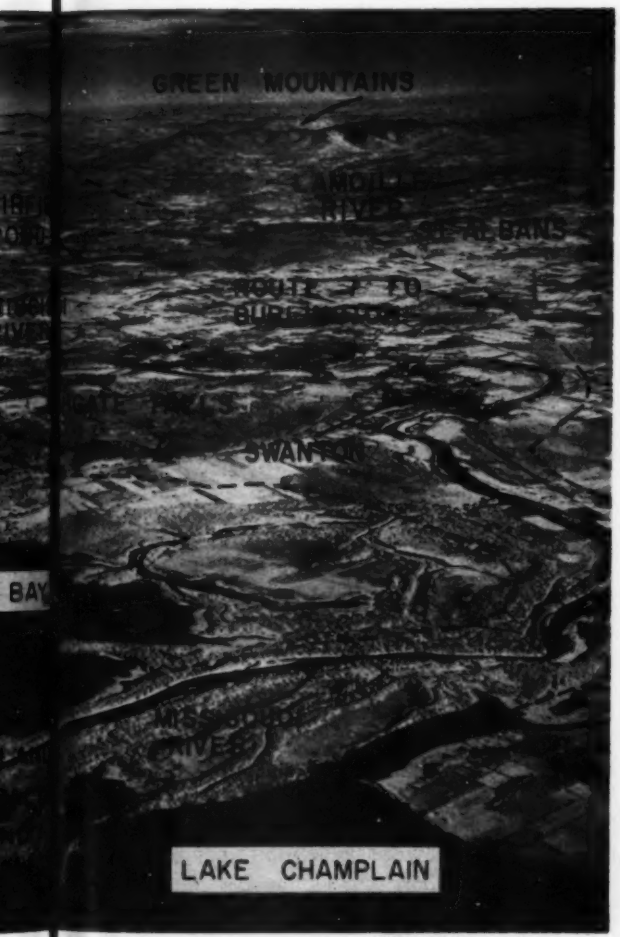


Note:—The author is information specialist, Soil Conservation Service, Upper Darby, Pa.

-T Show a Watershed

GORDS. SMITH

Also, be sure the plane you use will give you an unobstructed view of the land below. Don't include too much unnecessary foreground. Get as close to the edge of the watershed as possible. Be sure you know the watershed boundaries before you fly. Locate some large landmark in the watershed on a map, and take the map along. Be sure to shoot several exposures. One shot will always be better than the others.



To make the photograph even more interesting, outline the watershed area with india ink on a semimatte (non-glossy) print. Locate important landmarks such as lakes, streams, towns, highways, and sites of proposed watershed improvements.

The end-product makes an interesting visual aid for a watershed project. It can be used as a lead photograph for a newspaper story, a center of attraction in an exhibit, or a handy black-and-white slide for a local civic club talk.

LOCAL CONTRACTING

A Progress Report on Local Contracting for Works of Improvement on Small Watershed Projects

How is local contracting under Public Law 566 progressing? This phase of the small watershed program was inaugurated actively during the past year. The experiences, to date, indicate that the procedures devised by the Service for this work are proving to be satisfactory.

The first 30 locally awarded contracts, involving construction costs of $2,668,000 in Federal funds and $188,000 in local funds have been encouraging. Two contracts have been completed without any difficulties and with a remarkable degree of success. Floodwater-retarding structures and channel improvements are the principal types of work included in the 30 contracts.

Contracting organizations in 12 cases were soil conservation districts, in 9 cases special purpose flood control and water conservation or improvement districts, in 1 case an irrigation district, 2 by municipalities, 4 by county governing bodies, and 2 by drainage districts.

The first construction to get underway was a channel improvement project in Delaware. The contracting organization was the Bear Hole Tax Ditch, an authority created under State law. The State soil conservation committee was the local sponsoring organization. This project, which involved channel improvements of 27 miles and 64 erosion-drop structures, was started in September 1956, and is scheduled for completion in August 1958. The Service is contributing approximately $105,041 and the local organization approximately $67,000. The job is proceeding on schedule and only minor revisions have been made since its start. All parties to the project seem to be satisfied with the progress to date.

Work for one floodwater-retarding structure in the Hatch Valley of the North Salem Arroyo Watershed Project of New Mexico was contracted by the Caballo Soil Conservation District. It was completed at a cost of $34,893.56. This was the district's first experience with construction contracting, but results were satisfactory. In both the Delaware contract and the New Mexico one, the Service provided engineering and inspection services, as in most other contracts to date.

Where the local contracting organization has resources and experience, it is encouraged to use its own engineers and inspectors, as on the Turkey Creek Watershed Project in Texas. Here, a contract of approximately $62,000 ($32,000 Federal—$30,000 local funds), has been completed by the Fort Bend County Drainage District. This organization had been operating for a number of years and used its own engineers and inspectors on this job. SCS representatives checked the job occasionally, as needed in line with Service policy. The drainage district procedures and practices of administering a contract were followed with only minimum modifications to meet SCS and Federal requirements. The sponsoring local organizations of this project are the Coastal Plain Soil Conservation District, Fort Bend County Commissioners Court, and the Fort Bend County Drainage District.

In the Cummings Creek Watershed Project of Texas, 31 floodwater-retarding structures are to be built. Eight had been advertised and bids were opened by July 1957. Fifty interested persons attended bid openings. Bids received were in line with estimates. Construction costs for the first 8 structures are estimated at $380,000. The sponsoring organizations are: The Burleson-Lee, Bastrop-Fayette, Colorado, and Austin-Washington Soil Conservation Districts; the Lee and Fayette County Commissioners Courts; the Cummings Creek Watershed Association; and the Lee-Fayette Counties-Cummings Creek Water Control and Improvement District. The latter is the contracting organization. The chairman of the board of directors of the Water Control and Improvement District, a farmer, is the contracting officer. Legal assistance is provided by the two county judges.

Much more could be written about progress in other places, especially on projects in Illinois, Iowa, Louisiana, Oklahoma, South Carolina, West Virginia, and Utah, where progress is well along in contract stages. The program is gaining interest all the time and experiences gained are bringing simplification of procedures. The initial work on the part of Soil Conservation Service and local representatives has taken considerable time but has proved worthwhile. On the basis of experience so far it is believed that local organizations can and will do a good job of contract administration after they have some experience.

—ALVIN C. WATSON

GOOD FISHING

By CAL L. ROARK

THERE are about 40,000 farm ponds on district cooperators' farms in Tennessee, and nearly all of them are stocked with bluegill and largemouth bass. These ponds provide a lot of good fishing for the farmers who built them; many furnish sport and fish for town and city dwellers and extra income for the farmers. It is a common custom, in some localities, for city anglers to pay a small fee for fishing privileges in farm ponds.

G. E. Horn, chairman of the board of supervisors of the Davidson County Soil Conservation District, has four ponds on his place. All of them are stocked with fish and are fertilized regularly. Horn has made many friends and has taken in quite a bit of cash by allowing people from nearby Nashville and other communities to fish in his ponds. Here is his story, in his own words, about the first and most popular of his fish ponds:

G. E. Horn (right) and Fred Adams at the deposit box near one of Horn's fishing ponds.

"This pond was completed in 1951. It was stocked with bluegill that fall and with bass in June 1952. The pond was opened for public fishing in May 1955. There was a lot of private fishing for 2 previous years, but people both-

Note:—The author is State soil conservationist, Soil Conservation Service, Nashville, Tenn.

Horn fertilizing one of his fish ponds.

ered me so much, calling and getting permission to fish, that I put up a box and allowed the public to fish. The take from the box is from $500 to $1,000 per year.

"Some may not pay, but the honest ones do and my loss is not great. I would rather trust the people and have faith in my fellowman than gather that fraction of a percent that I may lose.

"The lake was largely excavated, as there were no hills to work between, making it cost $4,000. It covers 3½ acres. It has a 3½-inch drainpipe with a trickle tube. The water is piped out for stock water.

"The multiflora rose fence around the lake is 4 years old and is good. The banks are in fescue sod and areas between the bank and the rose fence are filled with shrub lespedeza and sericea lespedeza.

"I fertilize this pond, as well as my others, regularly to help make better fishing. The fertilizing is done simply by having someone row me about over the pond in a boat while I pour fertilizer from a bag into the water."

WIND EROSION IN SOUTH CAROLINA.—The State office of SCS reports that nearly 14,000 acres of crops were planted in strips for wind-erosion control in the coastal plains section of the State this year. Most of the farmers who tried wind-stripping are enthusiastic about the results.

CHRISTMAS TREES

(Continued from P. 90)

In this test only the shortleaf and Virginia pines survived satisfactorily, though the white pines had fair survival. Since then all of these trees have made an excellent growth. These varieties seem to have good possibilities as stabilizing vegetation.

Better quality soil on the test plots has helped in getting satisfactory survival and growth. In mining this land, the operators placed the topsoil over the sterile shale and rocks. The usual practice is to place the topsoil in the bottom of a trench, and then to cover it by the sterile shale and rocks. The result is a very poor quality soil material for growing vegetation.

A few trees were cut, from the trial plantings, for Christmas trees in 1955 and 1956. In 1957, a good harvest should be made.

Virginia pines, 5 years old, on strip mined land in Cherokee County, Kans.

All things considered, the most plausible solution for the strip pits problem in southeast Kansas seems to be Christmas tree production. However, better results would be obtained if the mining companies placed the surface soil on top rather than covering it with rock and shale. This project will take years to develop but could prove profitable in time.

—ROY E. CLEGG

SECOND-GROWTH TIMBER.—The widespread belief of some wood users that second-growth timber necessarily produces second-rate lumber is ill-founded, according to Benson H. Paul of the Forest Products Laboratory, Madison, Wis.

"Second-growth can, and often does, yield first rate wood—sometimes better than virgin timber harvested from similar land," he said.

They Don't Get Away

A Maryland District Keeps Most Cooperating Farms in the Fold by a Systematic Follow-up Program When Farms Change Owners.

By GROVER C. ZIMMERMAN

THE Carroll Soil Conservation District claims to have more cooperators applying conservation plans to their farms than any other district in Maryland. It's the State's only soil conservation district paying three affiliate memberships to the National Association of Soil Conservation Districts. That's because it's Maryland's only district having more than 1,000 cooperators. The district has always had a 100 percent record in paying both national and State association dues. It has more than 1,100 active cooperators out of a possible 2,650.

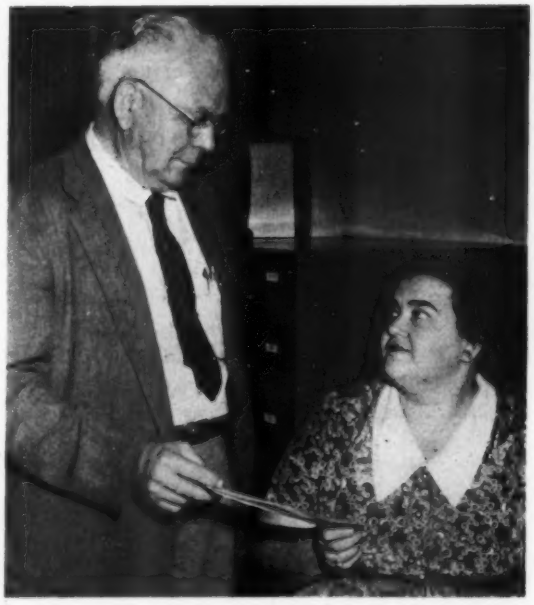
The key to this record is the district's plan of checking with each new owner as soon as a farm changes hands. Because of this follow-up plan, 88 percent of the new owners of previously cooperating farms continue as district cooperators. Ten percent of the new owners of previously noncooperating farms become cooperators. So a net loss of only 2 percent in cooperators results from farm transfers in the Carroll district. And, of course, farmers not involved in farm sales are continually coming into the fold as district cooperators.

As elsewhere, the turnover of farm ownership has been a problem in the Carroll district. In 1956, for example, 233 farms in the district changed hands. That's almost 10 percent of the district's total number of farms. In the first half of 1957, transfers involved 91 farms. The turnover seems to be leveling off, however, during the past few months.

The Carroll Soil Conservation District's board of supervisors faced up to this turnover problem in 1955. Their solution was that the board would have to make it a duty to check up on all farm transfers.

When the other supervisors pleaded they were too busy to take on any added chores, Raymond P. Buchman agreed to undertake the job. He had been a supervisor since the district was formed in 1944, and had been its treasurer since 1946. Buchman accepted the new duty, though he wasn't exactly what you'd call idle, either. He had a big turkey farm. True, he was gradually withdrawing from full-time management of the farm and turning the job over to his son-in-law, Jesse W. Heird. But he is still quite busy with farm affairs, and he has other things to do. For example, he's a vice president of the Hampstead Savings Bank.

This is how Buchman operates: Each Monday he goes to the Carroll County courthouse in Westminster and gets a list of the week's farm transfers. At the district's office he checks the list to note which farms have been



Buchman gets list of week's farm transfers from Mrs. Russell Lindsay, county transfer clerk.

Note:—The author is work unit conservationist, Soil Conservation Service, Westminster, Md.

cooperating with the district. The office keeps a card index of every farm and revises it weekly. It also keeps a book showing farm ownership changes.

On Tuesday, Buchman sets out to visit the new owners. He goes first to the farms that have been cooperating with the district.

"Timing has much to do with the success of this plan," Buchman stresses. "The idea is to get to the new owner before he can undo any of the conservation work already on the land, or before he starts a new farm enterprise that doesn't suit the land. When you get to the new owners in time, most of them continue the conservation plan already in effect. A few change the plan slightly to make it fit the kind of farming they want to do."

Buchman next visits the new owners of farms that had not been under cooperative agreement with the district. If the new owners live in the same area, he visits them the same day regardless of the previous status of the farm. This saves travel.

When the new owners agree to practice conservation, Buchman directs them to the Westminster SCS office, source of their technical help in carrying out their conservation program.

"If the new owner had been a district cooperator before, my job is easy," Buchman says. "He already is familiar with the district program. He knows the kind of help a cooperator gets from the Soil Conservation Service and other agencies. He realizes the value of a conservation program and is eager to continue as a conservation farmer.

"When the new owner has never been a district cooperator, my task is a little more involved. First I talk with him. I tell him the benefits of conservation farming. We walk over the farm together and note what conservation measures are on the land. I explain what each measure does. If it's a farm that hasn't had a conservation plan, I point out the erosion that has occurred and explain how it robs him. Often we go to a cooperating farm where he can see what the conservation practices look like and what they do.

"Sometimes I get no response. I feel discouraged. But later on, I've learned, the chances are good that the new owner will go to the Soil Conservation Service office and ask for help on a conservation plan. He has thought it over and decided that, after all, he needs a conservation program.

"There are times, of course, when the new owner isn't home when I call. So I have to return. I may have to spend 2 or 3 days a week in making these visits."

Buchman says he finds the people friendly and courteous even when they refuse to go along with conservation farming. The most frequent objections to a conservation plan: "I don't like those crooked rows"; and, "I don't want to have anything to do with the government."

Buchman (right) finds it easy to sign up John W. Harbaugh, a newcomer, as a district cooperator.

Buchman finds that a lot of city folks are buying farms to get out into the country. The men continue to work in town. Usually the city people make good farm managers, Buchman says. "They're nearly always interested in conservation," he states. "They want to know all about it."

The supervisors of the Carroll district are convinced that this follow-up effort is not only worthwhile but is necessary. They believe that this system is one reason the district has won three Goodyear awards.

"We have to do something to enroll the new farm owners," Buchman says. "Otherwise the conservation measures already on the land will be neglected and wasted. All the time, effort, and money put into them will go down the drain. Conservation will slide backward instead of moving forward.

"Other districts could do the same kind of follow-up work," Buchman believes. "Most district boards have a member who can devote time to it. Of course, our plan might not be the best. It's not the only one. Other districts may prefer to try a different method. But the responsibility is there. We can turn that responsibility into an opportunity—an opportunity for greater service in the cause of soil and water conservation. I know of no greater service, nor of one more urgently needed."

Face Lifting in South Dakota

Earth Moving or Soil and Water Conservation is a Major Enterprise Among Soil Conservation District Cooperators.

By C. D. BREHM

THE land surface of South Dakota is literally receiving a "face-lifting" through the construction of such soil- and water-conservation measures as terraces, diversions, stockwater ponds and dugouts, land leveling for irrigation, waterspreading, and improvement of irrigation and drainage systems. All of these operations require the movement of soil and are changing the topography of the State considerably.

Soil conservation district cooperators are now among the largest dirt moving groups in the State. Furthermore, succeeding years will likely show an increasing amount of earth moving for soil and water conservation.

Last year, (1956), 12,989,145 cubic yards of earth were moved on soil and moisture conserving practices in this State. About 8 million cubic yards were moved in the construction

Note:—The author is State conservation engineer, Soil Conservation Service, Huron, S. Dak.

Terrace construction with modern equipment in South Dakota.

Cutting a field to grade in the process of land leveling for irrigation in South Dakota.

of dams and dugouts for stock water. These ponds also afford opportunities for fish stocking and for migratory waterfowl.

Terracing, as a practice, is new in South Dakota. Yet, a little more than 2 million cubic yards of dirt were moved for terrace construction. This practice is likely to increase greatly during the next few years.

Outlets and waterways do not require a great amount of earthwork construction, but 400,000 cubic yards were moved for this practice. The shaping and filling of gullies to control runoff water is another conservation practice that will become greater in future years.

In central and western South Dakota, the practice of waterspreading on rangeland to provide additional hay is becoming popular and provides a substantial return to the rancher. About 400,000 cubic yards of dirt were used in the construction of diversion dams and dikes that divert and handle runoff water on waterspreading systems.

On irrigated farms, about 400,000 cubic yards were moved in leveling. This practice provides immediate returns to the irrigator by helping to get uniform stands of crops, more efficient irrigation, better drainage, and therefore greater cash returns. Its use is likely to increase greatly.

A little more than 200,000 cubic yards of earth were used in erosion control, detention dams, irrigation ditches, roadside erosion control, drainage, and spring developments.

It's difficult to realize just how much work is involved in the moving of 13 million cubic yards of earth. If all of this soil were placed in one large earthfill, visualizing the amount might be easier. If a dam 30 feet high were to be constructed with a 15-foot top width, and side slopes of 3 to 1 and 2 to 1, this dam would have a bottom width of 165 feet. Constructing a dam of this size and using the 13 million cubic yards of earth would make this structure about 25 miles long. A dam this size in South Dakota would be very noticeable to everyone.

This big soil moving operation did not just happen. In addition to the technical help provided by the Soil Conservation Service and cost sharing assistance from the Agricultural Conservation Program, contractors played a major part. In many cases, the contractors owned only two or three pieces of earthmoving equipment, but operated throughout the year. Some of the work was performed by farmers or

About 8 million yards of earth were moved last year in constructing ponds and dugouts similar to this in South Dakota.

ranchers, using their own equipment. This shows that small quantities of earthmoving per structure can become almost mountainous when many small structures are completed and the efforts of everyone are combined.

All of these practices mean that South Dakota farmers and ranchers are making tremendous efforts to store, utilize, and manage runoff water. The dry periods of past years have emphasized the need for dependable stockwater supplies and the need for supplemental irrigation. The conservation of moisture on cropland is also highly important. Practices that hold water and make it available to growing plants can mean substantial benefits to everyone. In some cases, it may mean the difference between a short crop and a complete failure. In areas of rolling topography, conservation measures not only encourage more rainfall to enter the soil, but also prevent serious erosion of the soil.

It is expected that the amount of earth moved in 1956 will be greatly exceeded in future years. The miles of terraces are increasing rapidly and this cubic yardage may eventually exceed the earth used in dams. Many more outlets and waterways will be shaped, as they are a key practice in many conservation plans. Waterspreading is very successful, and additional projects will be constructed. As erosion and flooding become more serious, more erosion control and detention-type dams will be utilized.

Between Tide And Marsh

By JOHN N. SELBY

W. CALVERT CULLEN put $22,500 into draining 235 acres of his truck farms near Painter, on Virginia's Eastern Shore. And he'll tell you he's glad he did. He quickly got it all back in bigger and higher quality yields of Irish potatoes and snap beans.

Cullen had a double-barreled drainage problem on a 155-acre neck of potato land; the ocean was on one side, a marsh on the other. When gales whipped up high tides, salt water damaged his land and crops. When rains were heavy, fresh water lingered on his farm and again water damaged his soil and crops. To get the fresh water off, Cullen had crisscrossed his fields with open ditches 4 feet deep. The ditches hampered normal field work, while failing to keep the salt water out.

Cullen asked the Eastern Shore Soil Conservation District for help. The district supervisors called in SCS technicians, who went over the land with Cullen. With their help, he prepared an overall soil- and water-conservation plan. A private contractor did the work.

The first step was to solve the drainage problems. Cullen did that by building an earthen dike 3.700 feet long and 6 feet high along the marsh side of his farm. He built a similar dike 600 feet long on the ocean front.

Then he installed four circular, cast iron tide gates in the dikes. The gates do the neat trick of automatically controlling the water. If the tide comes up, the gates keep the salt water out. If there's too much rain, the gates let the fresh water out. If heavy rain and high tide come at the same time, a ditch 3 feet deep inside the dike holds the fresh water until the gate can open to let it out. Spoil from the ditch went into the dikes.

To drain the fresh water, Cullen installed

Note:—The author is soil conservationist, Soil Conservation Service, Accomack, Va.

1,850 feet of 8-inch agricultural tile mains, 6,700 feet of 6-inch laterals, and 1,500 feet of 4-inch laterals. That took care of 60 acres that had been causing trouble in the 155-acre neck. To keep salt water out of the tile, Cullen put small, circular cast iron gates in some of the mains that emptied into the marsh.

This drainage system let Cullen fill up all of the open ditches but two short ones. They're used now as outlet ditches.

After that, Cullen took a breather to see what would happen. Potato yields jumped. They went from 100 to 150-165 hundred-pound bags an acre. Quality was up, too. A difference in quality can mean $3 a bushel instead of 75 cents.

When Cullen completes his planned irrigation system, he looks for a yield of 300 bags an acre. That's what he has been getting on irrigated land of another farm.

Pleased with results, Cullen completed the drainage job. He put in 17,000 more feet of tile. That took care of another 78 acres.

Next, he turned to his nearby farm where he has 75 acres in Irish potatoes and snap beans. There he had the same drainage problem on 40 acres of extremely wet Falsington fine sandy loam soil. That soil is able to produce potatoes and beans early. The only trouble was that high tides and excess fresh water sometimes prevented early planting.

Cullen built an earthen dike 3,000 feet long and 6 feet high on the marsh side. That was the only side affected. Spoil taken from an inside ditch made the dike. The ditch holds excess fresh water when it can't get out. Two tide gates control the water.

Cullen finished the drainage job by installing 24,000 feet of tile in the 40 acres. He cut 600 feet of outlet ditches 20 feet wide. The ditches are in the marsh, and they're out of the way of farm operations.

All the dikes were designed to hold back salt water that sometimes rises 4 feet above mean high tide. These dikes should take care of everything but the most violent hurricanes.

Benefits of the tile drainage system are not limited to the actual acres tiled. Benefits show up all over the farm.

By tiling, Cullen was able to do away with nearly all open ditches. That has meant greater efficiency in the use of equipment and manpower. It has reduced turning time and wear-and-tear on equipment. There's less wasted acreage in ditch banks and turn rows.

No longer is Cullen's well-drained soil kept wet by adjacent poorly-drained soil. The tile drainage has helped both kinds of soil. With his tile drainage system installed, he is now able to plow the whole farm at one time; no more dodging around wet spots, no more returning to plow the wet spots as they dry, one after the other.

Likewise Cullen can now cultivate and harvest his whole farm at once. He knows that if it rains, his crops won't be drowned out by standing water. He knows too that he can harvest his crops even under fairly wet conditions.

With the drainage job finished, Cullen doubled potato and bean yields and quality improved. Now he can get the early crops that bring premium prices.

Drainage, though, is not the only part of his soil- and water-conservation work.

"I keep the land in good condition by growing soil-improving crops," he explains. "I grow only one cash crop a year on the same soil. After I harvest the beans and potatoes, I plant sorghum. In the fall I disk the sorghum into the topsoil. Then I plant rye as a winter cover crop. I turn the rye under in January. Then I prepare the land for the new crop of potatoes and beans.

A 30-inch tide gate on the Cullen farm keeps salt water out but lets fresh water drain away.

"I fertilize heavily to restore the plant food that high yields take out of the soil. At planting time I put down 2,000 pounds of 5-10-5 an acre on potatoes and 700 to 900 pounds of 5-10-5 on snap beans.

"With these sensitive truck crops, you also have to keep a sharp eye on the lime level. A slight change one way or the other can make a big difference in yield and quality. A lime level of 5.2 to 5.3 is best for our Irish potatoes."

The Incinerator is Gone

Farmers Near Carlsbad, N. Mex., Have Put Cotton Gin Incinerators Out of Business by Using All Gin Trash for Soil Conditioning.

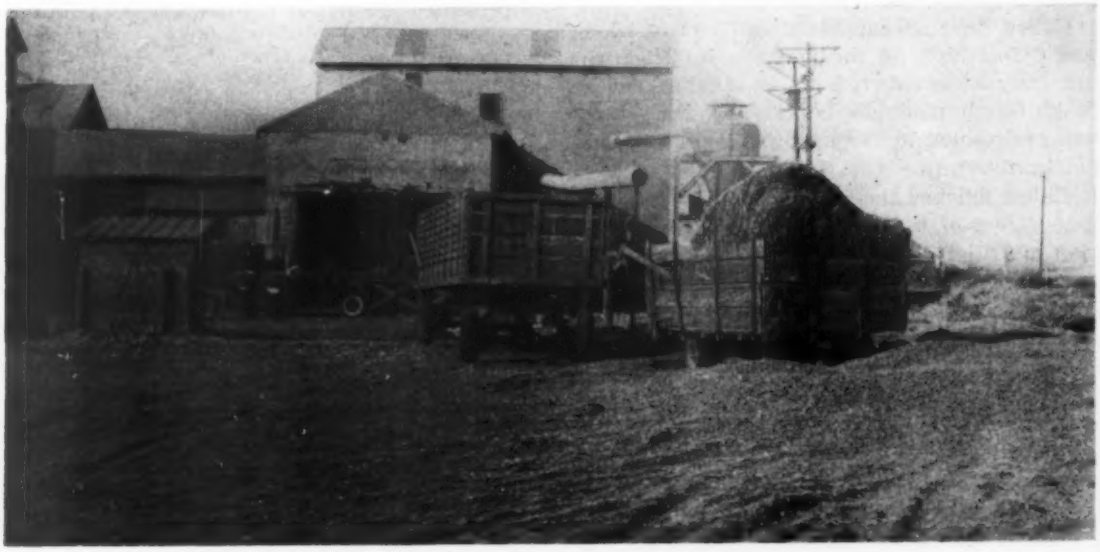
By W. H. ATKINSON

THREE years ago an incinerator to burn gin trash was a standard item at all cotton gins in the Carlsbad Soil Conservation District of New Mexico. It is no longer standard equipment. The incinerator is gone, because all gin trash now is being put back into the soil from which it came. Glenn Brown, who farms 215 acres near Loving, N. Mex., was greatly responsible for this change.

Brown, a cooperator with the Carlsbad district, was not the first to put gin trash back on the land, but he was the first to do it on a large scale in this district. The farm Brown purchased in 1953 was not yielding as he thought it should. Water was being wasted, the land was poor and hard to cultivate. He thought this could be corrected, so he set out on a conservation plan that would improve all agricultural operations on the farm.

The conservation plan included land leveling, soil building, water management, and crop selection. In the soil building phase, the gin

Note:—The author is work unit conservationist, Soil Conservation Service, Carlsbad, N. Mex.



Gin trash loaded for hauling to nearby farms for soil improvement.

Glenn Brown

trash first entered the picture. Leveling had removed top soil. The exposed subsoil was hard to plow, took water slowly, and yielded poorly. Not having enough barnyard manure to do the full job, Brown remembered the gin across the road, where all gin trash was being burned.

Supplementing the barnyard manure with gin trash and commercial fertilizer was the conservation practice that Brown thought should do the job of improving his soil. Many farmers suggested that he was just filling his farm with weeds, grass, diseases, and insects; but, Brown kept right on hauling gin trash. He applied load after load to the cut areas, plus some manure and commercial fertilizer. All was turned under and allowed to decompose. None of the ill omens came true and after a year Brown's yields had increased from 1½ bales of cotton per acre to 2½ bales per acre. The soil's workability had greatly improved. Water went into the soil much more rapidly, and a person could not tell the cut areas from the filled areas.

The results were so good that this author wrote an article for the local papers and almost lost a friend. The story is this: Brown was the sole taker of gin trash in his first year's operations, but after the news article appeared there was such a demand for the gin trash that it had to be allotted to a farmer according to the number of cotton bales he had ginned. Brown had to line up with the rest of the farmers and take his turn.

"All because of your article," he says. This I hope is true, although I believe that "seeing is believing" is the true salesman.

Brown has okayed this article, so he has no one but himself to blame if he puts more incinerators out of business.

REVIEWS

SOIL: The Yearbook of Agriculture. 784 pp. Illustrated. 1957. Washington 25, D. C.: U. S. Government Printing Office. $2.25.

THIS book was planned and written cooperatively by workers in the U. S. Department of Agriculture and in the State land-grant colleges. It is designed to tell the facts about soil use and management and explain the principles applicable in the United States. Readers may find it a useful reference for several years to come.

The authors aimed to cover soil management for the major kinds of soil and kinds of farming in this country. The emphasis is upon good combinations of practices and the reasons for them. The book cannot cover every field and garden in the United States, but it does include the basic practices. Although it lays a useful background for up-to-the-minute local bulletins and recommendations about details, it is not a substitute for them.

Although readers may begin anywhere, the chapters are arranged in approximate order for the easiest reading of the whole book, beginning with the more fundamental concepts that are basic to the applications described later on.

First of all, the reader is shown the significance and place of soil management within the broad field of agriculture and the highlights of its early historical development. Since the application of science accounts for the recent great advances, the authors try to show how new scientific principles are developed.

Second, the reader is shown what soils are and why there are so many kinds. Next, the basic principles of their behavior are displayed, especially how soils take in, store, and release

the nutrients, water, and air that plants need for growth.

Third, the authors have set forth practical methods for accomplishing specific objectives in soil management, such as liming, tillage, fertilizing, controlling moisture, preventing erosion, and so on.

Fourth, the separate practices are brought together into systems of soil management to show how they support one another. The requirements and methods for developing farm plans and systems of soil management for high production with conservation are set forth.

Fifth, the opportunities for improved systems of soil management in the United States are explained broadly in a series of chapters for 15 broad regions of the United States. Some readers may want to begin here, with the region they know best.

Sixth, soil management systems for forest trees, gardens, and a few special crops, that have requirements somewhat unlike those for the general run of field crops, are summarized in a group of chapters that follow the regional ones.

Finally, the book includes a brief glossary of special words and phrases used in writing about soil management.

Big as it is, this book has at least four limitations:

First, it cannot be entirely up-to-date by the time the reader sees it. Many months were needed to write it, and several more to see it through the presses. Then, it must find its way to the reader. In the meantime the world we live in has been changing. Economic problems change; laws affecting agriculture are changed; scientists continue their research; and technology finds new ways to do things.

Second, the book is far narrower than its title suggests. It deals with soil management and touches but very lightly on the many other aspects of soil science.

Third, any book like this is written for many people. Rarely can it answer all the questions on a *specific* farm or garden. We have millions of farms in this country, and more millions of gardens, on nearly as many kinds of soil, if we take account of every difference between all of them, including the natural differences and those made by previous use. And the possible soil uses in a continental country like ours are nearly beyond count.

Fourth, this is not a world book. Although world experience has been drawn upon considerably, especially that of Western Europe, the focus has been entirely on the continental United States.

Probably this reviewer had too much to do in outlining and helping with the book to criticize it objectively. I think it is a good book. As in any such book prepared by over 140 authors scattered throughout the country, some parts are better than others. Because of space limitations, charts and pictures are too few.

It is a book for study and reference, to be used I hope, by many farmers and gardeners, and certainly by every soil scientist and soil conservationist. —CHARLES E. KELLOGG

WOODLAND MANAGEMENT.—A 57-year study of 3 plots planted to red pines in 1900, at the North Central Experiment Station in Minnesota, shows that an acre of well-managed forest can bring the owner an annual income of $12 per year. The records, kept since 1915, show annual growth from 452 to 560 board feet per acre. This is about 3 times what should be expected from an unmanaged natural stand.

CONSERVING WATER.—We must do a great deal more to conserve our supplies of water. We have only just begun to use soil properly to conserve rainfall. Much of our present use of irrigation water is wasteful.

EZRA TAFT BENSON
Secretary of Agriculture